

Spontaneous Healing of a Pediatric Scaphoid Proximal Pole Fracture Nonunion

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Abstract

Background Scaphoid fractures in the pediatric population are rare. The majority of nondisplaced fractures tend to unite; however, there is an increased risk of nonunion in proximal pole fractures. Limited evidence exists in their outcomes, owing to the scarcity of the fracture pattern.

Case Description A 13-year-old boy who presented late after developing a traumatic proximal pole scaphoid fracture developed nonunion. He was treated conservatively owing to it being asymptomatic and developed union at 18 months.

Literature Review No previous case of proximal pole pediatric scaphoid fractures with established nonunion that has developed union with conservative management has been described.

Clinical Relevance The authors highlight a unique case of an established proximal pole scaphoid nonunion in a child progressing to union with nonoperative intervention. Owing to its rarity and difficulty in obtaining research, we recommend consideration of nonoperative management of asymptomatic nondisplaced proximal pole fractures in children.

Keywords

- ▶ scaphoid fracture
- ▶ proximal pole
- ▶ pediatric scaphoid nonunion

Scaphoid fractures in the pediatric population are rare, comprising 3% of hand and wrist fractures.¹ They predominantly occur between the ages of 13 and 17 years.² The low incidence has been attributed to three effects: the cartilaginous state of bone; a transmitted loading causing distal radius fractures; and missed diagnoses ascribed to wrist sprains.³ Historically, only 1% of pediatric scaphoid fractures occurs in the proximal pole,⁴ which is due to the chronological ossification pattern following its distal to proximal vascular supply. However, new epidemiological data suggest this has risen to 6%, attributing this to the increase in high-energy sport injuries and rise in body mass index.²

We describe a unique case, not previously identified in the literature, of a pediatric scaphoid proximal pole fracture with an established nonunion which progressed to union at 18 months, with no surgical intervention.

Case Study

A right-hand dominant 13-year-old boy sustained a forced flexion injury of his wrist with axial loading when he was trapped between the ground and an opposing larger rugby player during a tackle. He delayed presenting to the local fracture clinic until 6 weeks following the trauma. Radiographs demonstrated a proximal pole fracture of the right scaphoid. He was treated in a scaphoid cast for 6 weeks and reviewed following this period of immobilization. He had persisting tenderness in the anatomical snuffbox but good range of movement. Radiographs at the time demonstrated no progression to union. He was managed with a further 6 weeks of cast immobilization. At 18 weeks postinjury, he was asymptomatic but radiographs demonstrated a persistent fracture line. A magnetic resonance imaging scan confirmed bone resorption with a fracture gap of 2 mm

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suggesting nonunion at 18 weeks and he was referred for a second opinion. His cast immobilization was removed at this stage.

Given the persisting lack of progression toward union, the management options were outlined to the patient and his father. They were offered either close surveillance or open reduction and internal fixation of the scaphoid with bone graft augmentation. As he was asymptomatic, the former was chosen by the patient and his father. He remained asymptomatic and repeat imaging at 6 and 12 months (►Fig. 1) continued to demonstrate nonunion, but on subsequent radiographs at 18 months (►Figs. 2 and 3), union had been achieved. He maintained a pain-free full range of movement compared with his left wrist on final review, with a full return to activity without the need for physiotherapy.

Discussion

We believe that this is the first case described in the literature of an established pediatric scaphoid proximal pole nonunion progressing to union without any surgical intervention.

Scaphoid fracture is a rare injury in the child and more than 90% of scaphoid fractures in the pediatric population will unite with cast immobilization.^{1,2} However, the median time to union for proximal pole fractures (13 weeks) is significantly longer than for waist (10 weeks) and distal pole fractures (6 weeks).² Furthermore, proximal pole injuries are at significant risk of developing nonunion, alongside late-presenting or displaced fractures. The rationale



Fig. 1 A posteroanterior view of the right wrist demonstrating nonunion at 6 months postinjury (February 2015).



Fig. 2 A scaphoid view of the right wrist demonstrating union at 18 months postinjury (February 2016).



Fig. 3 An oblique view of the right scaphoid demonstrating union at 18 months postinjury (February 2016).

being that the dorsoradial vascular supply is interrupted leading to ischemia of the proximal segment.

There is considerable debate on the management of pediatric scaphoid nonunion, owing to the rarity of this injury pattern. Only limited case reports and case series of late spontaneous union of established pediatric scaphoid nonunion have been described.⁵⁻⁷ However, these reports are isolated to waist and distal pole nonunions. Clarke et al and Manak et al have described cases of a 14-year-old and 11-year-old boys, both with a scaphoid waist nonunion that progressed to union at around 2 years following injury.^{5,8} Weber et al retrospectively documented a case series comprising six cases of late union of a pediatric scaphoid nonunion, five of which were confined to the waist and one to the distal pole.⁷ In the adult population, there is only one case of an established scaphoid proximal pole nonunion uniting with no surgical intervention.⁹ This patient showed evidence of interval healing at 18 months with complete union at 24 months.

The pediatric scaphoid is fundamentally different to that of an adult, the ossific nucleus is cloaked in a cartilaginous cover during development,¹⁰ and this could explain why late union around the time of a growth spurt occurs. There will be increased vascularity and expression of growth factors which may promote bone growth at a nonunion site.

We would advocate that surgical intervention is reserved for established symptomatic nonunion and displaced fractures. We acknowledge that conducting pediatric scaphoid nonunion research would be extremely difficult. Due to the challenges of the surgical intervention and the potential for these fractures to progress to late union, we believe that the option of observation and initial nonsurgical management should be considered for asymptomatic scaphoid nonunion in children.

Funding

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Conflict of Interest

None.

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